IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No.:	10/053,179	**Art Unit:**	2477
Inventor:	Kenneth L. Stanwood	**Examiner:**	Sefcheck, Gregory B
Filed:	January 15, 2002	**Confirmation No.:**	2846
Title:	PACKING SOURCE DATA PACKETS INTO TRANSPORTING PACKETS WITH FRAGMENTATION	**Docket No.:**	112174-010UTL

APPEAL BRIEF (37 C.F.R. § 41.37)

Mail Stop Appeal Brief - Patents
US Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This is an Appeal from the rejection of claims 51-75 and 82-98 in the Final Office Action of August 26, 2010 (the "Office Action"), relating to the above-referenced application.

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I. REAL PARTY IN INTEREST

Wi-LAN, Inc. is the real party in interest.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals and/or interferences currently pending.

III. STATUS OF CLAIMS

Claims 51-75 and 82-98 are pending in the case, are rejected, and are appealed herein. Claims 1-50 and 76-81 have been previously cancelled.

IV. STATUS OF AMENDMENTS

Amendments to claims 51, 63, 72, 83, and 89 were submitted on October 26, 2010 in an after-final response to the Office Action. However, per the Advisory Action of November 1, 2010, these amendments were not entered for the purpose of appeal. Thus, the last amendments to the claims that have been entered were submitted on July 26, 2010 in a response to the non-final rejection of March 25, 2010.

V. SUMMARY OF CLAIMED SUBJECT MATTER

In one embodiment, the specification of the present application discloses systems and methods for wireless communication. For example, Figure 9 (reproduced here) is a functional block diagram of a base station for use in a wireless communication system.

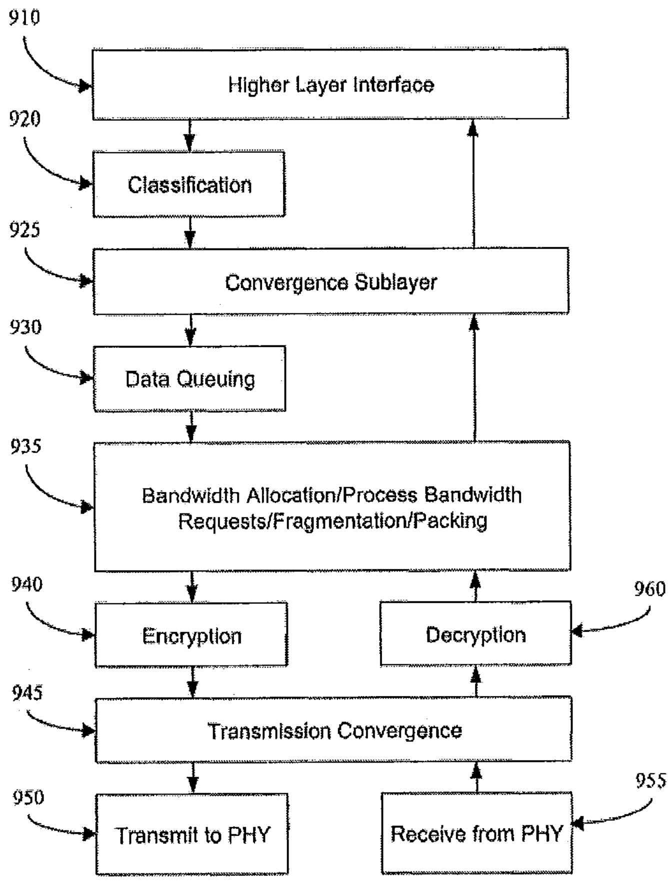

Figure 9

As shown in Figure 9, the base station includes a bandwidth allocation/process bandwidth request/fragmenting/packing (BPFP) module 935. The BPFP receives packets of data referred to as Service Data Units (SDUs). SDUs are data packets utilizing a particular protocol and format. Page 1, ll. 19-25. In order to most efficiently use the wireless communication links available at the base station, the BPFP packs the SDUs into data packets of a different format referred to as protocol data units (PDUs). While the SDUs are being packed into PDUs, SDUs may be fragmented if the remaining space in a PDU cannot store a whole SDU. Page 21, ll. 1-4.

In one embodiment, the size of the Protocol Data Unit (PDU) is made to be variable, and determined frame-by-frame (see length field in Figures 7 and 14). In tuning the PDU size, the base station components take into account the bandwidth allocated to the respective connection

and all connections that receive bandwidth in the current frame. "Additionally, it is advantageous to coordinate packing and fragmentation with bandwidth allocation so that a communications system can be most flexible and able to capitalize on the circumstances that may exist in any one communications cycle. This system also utilizes a method of packing variable length SDUs that is advantageously adaptive." Page 29, lines 7-11. As described in relation to Figure 11, the described methods may also be implemented at a node, such as a subscriber station, that communicates with the base station.

Reference to the specification and drawings of examples of the subject matter defined in each of the independent claims and certain of the dependent claims involved in the appeal are set forth below. All references to pages are from the specification as filed.

Claim 51

A node for use in a communications system that packs and fragments variable-length service data units (SDU) for mapping into variable length protocol data units (PDU), each PDU having a payload area, and a header area, each SDU being associated with a specified connection, the node comprising: [Figs. 1-3 and 9 and 14; page 19, ll. 18-31; page 28, ll. 1-17]

a communications processor configured to pack and fragment service data units associated with the specified connection into a protocol data unit, including performing the following operations: [Fig. 9; page 19, ll. 18-31]

establishing a length for the protocol data unit based on bandwidth allocated to the specified connection in a current frame, [Figs. 9 and 11; page 17, ll. 19-23; page 21, ll. 12-16; page 24, ll. 17-19; page 27, ll. 25-30]

mapping a first service data unit to the payload area of the protocol data unit, [Fig. 13; page 27, ll. 9-11]

determining whether a second service data unit is larger than the remaining payload area of the protocol data unit, [Fig. 13; page 26, ll. 18 – page 27, line 30]

if the second service data unit is not larger than the remaining payload area of the protocol data unit, then mapping the second service data unit to the remaining payload area of the protocol data unit, and [Fig. 13; page 26, ll. 18 – page 27, line 30]

if the second service data unit is larger than the remaining payload area of the protocol data unit, then fragmenting the second service data unit into at least two fragments and mapping the first fragment to the payload area of the protocol data unit, wherein: [Fig. 13; page 26, ll. 18 – page 27, line 30]

the header area of the protocol data unit includes a length field specifying the length of the protocol data unit, and [Fig. 8; page 17, ll. 15 – page 18, ll. 4]

the payload area of the protocol data unit includes a packing subheader for each service data unit and each service data unit fragment packed in the payload area, the packing subheader specifying the length of a respective service data unit or a respective fragment. [Fig. 8; page 19, ll. 3-17]

Claim 63

A base station for use in a communications system, that packs and fragments variable-length service data units (SDU) for mapping into variable length protocol data units (PDU), each

PDU having a payload area, a header area, and being associated with a specified connection, the base station comprising: [Figs. 9 and 14; page 19, ll. 18-31; page 28, ll. 1-17]

a communications processor configured to pack and fragment service data units associated with the specified connection into a protocol data unit including performing the following operations: [Fig. 9; page 19, ll. 18-31]

establishing a length for the protocol data unit based on bandwidth allocated to the specified connection in a current frame, wherein the bandwidth allocated to the specified connection is established based on one or more communication parameters, [Fig. 9; page 17, ll. 19-23; page 21, ll. 12-16; page 27, ll. 25-30]

mapping a first service data unit to the payload area of the protocol data unit, [Fig. 13; page 27, ll. 9-11]

determining whether a second service data unit is larger than the remaining payload area of the protocol data unit, [Fig. 13; page 26, ll. 18 – page 27, line 30]

if the second service data unit is not larger than the remaining payload area of the protocol data unit, then mapping the second service data unit to the remaining payload area of the protocol data unit, and [Fig. 13; page 26, ll. 18 – page 27, line 30]

if the second service data unit is larger than the remaining payload area of the protocol data unit, then fragmenting the second service data unit into at least two fragments and mapping the first fragment to the payload area of the protocol data unit, wherein: [Fig. 13; page 26, ll. 18 – page 27, line 30]

the header area of the protocol data unit includes a length field specifying the length of the PDU, and [Fig. 8; page 17, ll. 15 – page 18, ll. 4]

the payload area of the protocol data unit includes a packing subheader for each service data unit packed in the payload area, the packing subheader specifying the length of a respective service data unit. [Fig. 8; page 19, ll. 3-17]

Claim 83

A method of formatting protocol data units (PDUs) from incoming variable-sized service data units (SDUs) for transmission of data carried by the PDUs over a communication channel shared by one or more user connections, comprising, for a specified connection: [Fig. 13; page 26, ll. 18 – page 27, line 30]

provisioning a protocol data unit (PDU), including a header and a payload area, [Fig. 8; page 17, ll. 15 – page 18, ll. 4] wherein the length of the PDU is established in conjunction with the bandwidth amount allocated to the specified connection in a current frame, the bandwidth amount being established frame-by-frame based on one or more communication parameters associated with the specified connection and general system parameters; and [Fig. 9; page 17, ll. 19-23; page 21, ll. 12-16; page 27, ll. 25-30]

packing and fragmenting the SDUs associated with the specified connection into the payload area of the PDU based on the current length of the payload area. [Fig. 13; page 26, ll. 18 – page 27, line 30]

Claim 89

A method for use in a communications system that maps variable length service data units (SDU) associated with a specified connection according to a plurality of service level for the data carried by the SDUs, into a protocol data unit (PDU) [Fig. 13; page 26, ll. 18 – page 27, line 30] having a variable-length payload area and a header area, the method comprising: [Fig. 8; page 17, ll. 15 – page 18, ll. 4]

establishing a length for the protocol data unit based on bandwidth currently allocated to the connection in a current frame, wherein the bandwidth allocated to the connection is established based on one or more communication parameters; [Fig. 9; page 17, ll. 19-23; page 21, ll. 12-16; page 27, ll. 25-30]

receiving a first service data unit and a second service data unit; [Fig. 13; page 26, ll. 18 – page 27, line 30]

fragmenting the second service data unit into at least two fragments; [Fig. 13; page 26, ll. 18 – page 27, line 30]

packing the first service data unit and a corresponding packing subheader into the payload area of the protocol data unit; and [Fig. 13; page 26, ll. 18 – page 27, line 30]

packing a first fragment of the second service data unit and a corresponding packing subheader into a remaining portion of the payload area of the protocol data unit, [Fig. 13; page 26, ll. 18 – page 27, line 30]

wherein each packing subheader comprises a length field specifying the length of the corresponding service data unit and a fragmentation control field indicating whether the corresponding service data unit is a first fragment, a continuing fragment, a last fragment, or an unfragmented service data unit. [Fig. 8; page 17, ll. 15 – page 19, ll. 17]

Claim 91.

The node of claim 51, further comprising a classification module for classyfing the SDUs based on at least a connection identifier, for enabling packing and fragmenting of the SDUs on the connection in a PDU allocated to that connection. [Fig 11; page 20, ll. 10-12]

Claim 95

The node of claim 91, further comprising a communication control module which prepares a bandwidth allocation map with the bandwidth allocated to each node sharing the communication channel. [Page 20, ll. 9-30]

Claim 96

The node of claim 95, wherein the communications processor establishes the bandwidth allocated to each connection from the bandwidth currently allocated to a respective node based on the priority and type of the connections served by the node. [Page 20, ll. 9-30; page 23, ll. 24 – page 24, ll. 22]

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Whether claims 51-55, 63-67, 75, 82-90, 97, and 98 are unpatentable over Kordsmeyer et al. (U.S. Patent No. 6,963,751) in view of Van Grinsven et al. (U.S. Patent Patent Pub. No. 20010015985) under 35 U.S.C. §103(a).

B. Whether claims 56 and 68 are unpatentable over Kordsmeyer in view of Van Grinsven and Sengodan et al. (U.S. Patent No. 6918034) under 35 U.S.C. §103(a).

C. Whether claims 57-62 and 69-74 are unpatentable over Kordsmeyer in view of Van Grinsven and Caronni et al. (U.S. Patent No. 6970941) under 35 U.S.C. §103(a).

D. Whether claims 91-94 are unpatentable over Kordsmeyer in view of Van Grinsven and Hathaway et al. (U.S. Patent Pub. No. 20020126677) under 35 U.S.C. §103(a).

E. Whether claims 95 and 96 are unpatentable over Kordsmeyer in view of Van Grinsven, Hathaway and Payne (U.S. Patent Pub. No. 20060062250) under 35 U.S.C. §103(a).

VII. ARGUMENT

A. Claims 51-55, 63-67, 75, 82-90, 97, and 98 are patentable over Kordsmeyer in view of Van Grinsven.

In the Office Action, claims 51-55, 63-67, 75, 82-90 and 98 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kordsmeyer (U.S. patent no. 6,963,751) in view of Van Grinsven (U.S. pub. 20020015985).

Kordsmeyer describes a system in which service data units are packed and fragmented into PDUs. As was admitted in the Office Action, the PDUs have a fixed size (which does not change). The fixed size is predetermined by the radio interface protocol. (Kordsmeyer, col. 2, lines 42-47 ("The protocol data units are adapted to the DECT radio interface protocol, especially to the DECT-related TDMA structure and to the various types of transmission for transmitting service data . . ."); and see, col. 2, line 62 - col. 3 line 4, and col. 7, line 59 - col. 8, line 1).

Kordsmeyer identifies inefficient use of the data fields of the fixed size PDUs where each PDU only contains one SDU or one fragment of an SDU as a problem he is addressing. "[T]he shaded area of the data field DAF in FIG. 1 remains unused for the transmission of service data. Ultimately, this has the result that the radio channel capacity available in accordance with the DECT standard is not optimally utilized. In other words, the bandwidth available in the DECT system for the telecommunication is poorly utilized." (Kordsmeyer, col. 3, lines 52-57). His solution is to re-purpose fields in the PDU as defined in the preexisting radio interface protocol to permit multiple SDUs or SDU fragments to be placed into a single PDU. Fundamentally, Kordsmeyer describes a modification to the existing DECT protocol to improve its bandwidth usage efficiency. At its broadest, Kordsmeyer characterizes its solution thusly: "This object is

achieved by a method for transmitting service data in telecommunication systems with wireless telecommunication based on a predefined radio interface protocol between telecommunication devices." (Kordsmeyer, col. 6, lines 38-41, emphasis added).

Van Grinsven describes modifying the approach described in the DAVIC (Digital Audio Video Council) 1.1 standard to also accommodate data formats besides ATM, for example, "STM, which requires fixed length data words having a repetition rate of 125 *u*s, or variable length data formats such as Ethernet packets or IP (Internet Protocol) packets." (Van Grinsven, paragraph [0006]). Van Grinsven describes this system as having three different types of PDUs which are assembled into frames for transmission. One of the types of PDUs (the type described the least in Van Grinsven) is described as being a "variable length cell PDU." (See, Van Grinsven, paragraph [0041]). This variable length PDU is described as having its payload size adjusted to match the size of the variable length cell it will transport. The maximum size is 143 bytes. Cells larger than 143 bytes are fragmented. (See, Van Grinsven, paragraph [0042]). Therefore, Van Grinsven describes selecting the size of the PDU based upon the size of the incoming cell (the cell to be transported) unless the size of the cell exceeds the maximum size (143 bytes), in which case the cell is fragmented and the PDUs for each of the fragments are selected to be the size of the fragments (again, with a size limit of 143 bytes). Van Grinsven does not describe setting the length of the PDU based on bandwidth allocated to the respective connection in a current frame by the communication processor, as claimed. In addition Van Grinsven does not provide any teaching or description of the fragmenting process.

1. The references do not suggest every claimed element.

As explained in the Manual of Patent Examination Procedure §2142, entitled Legal Concept of *Prima Facie* Obviousness, for obviousness under 35 U.S.C. §103, "to support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." As set forth in detail below, the outstanding rejections are improper because the cited references do not suggest the claimed invention either explicitly or impliedly.

The references do not teach or suggest the limitation of "establishing a length for the protocol data unit based on bandwidth allocated to the specified connection in a current frame," (claim 51; "establishing a length for the protocol data unit based on bandwidth allocated to the specified connection in a current frame", claim 63; "the length of the PDU is established in conjunction with the bandwidth amount allocated to the specified connection in a current frame", claim 83; and "establishing a length for the protocol data unit based on bandwidth currently allocated to the connection in a current frame" claim 89).

The Office Action acknowledges that "Kordsmeyer discloses fixed length PDUs. Thus, Kordsmeyer does not explicitly disclose establishing the length of a variable length PDU in conjunction with the bandwidth allocated to the connection[.]" Office Action page 4.

However, the Office Action alleges that Van Grinsven cures this deficiency in Kordsmeyer. In particular, the Office Action asserts that the size of the cell being transported in the PDU is "equivalent to the 'bandwidth currently allocated to a connection in a current frame based [sic] one or more communication parameters', as claimed." O.A. page 17. No support in

Van Grinsven can be found for that assertion. There is no indication in Van Grinsven that the size of a single cell (for example, an Ethernet packet or a TCP/IP packet in the case of the variable length cell PDU) correlates to the bandwidth allocated to the connection to which that cell is being sent. There is also no support in Van Grinsven for the underlying assumption that the connection is being sent only one cell. To the contrary, there is description in the fixed PDU examples of Van Grinsven of a single cell not correlating to the amount of bandwidth allocated to a connection. (See, for example, Van Grinsven, paragraph [0032] which describes sending multiple packets to a connection). As Kordsmeyer and Van Grinsven both fail to teach or suggest the identified limitations, Appellant respectfully submits that independent claims 51, 63, 83, and 89 are allowable over the cited references. Appellant further submits that the same arguments apply to dependent claims 52-55, 64-67, 75, 82, 84-88, 90, 97, and 98 and these claims are allowable for at least the same reasons.

2. The references cannot properly be combined.

As explained in the Manual of Patent Examination Procedure §2142, entitled Legal Concept of *Prima Facie* Obviousness, for obviousness under 35 U.S.C. §103, "to support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." As set forth in detail below, the outstanding rejections are improper because the examiner did not present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the cited references.

The Office Action alleges that the combination of Kordsmeyer and Van Grinsven would have been obvious to one of ordinary skill in the art. Office Action, page 5. However, as stated in M.P.E.P. §2143.01: "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)." Section 2143.01 further provides that "if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)."

The modification proposed to Kordsmeyer in the Office Action would render it unsatisfactory for its intended purpose. It would also change the principle of operation of Kordsmeyer. As described above, and acknowledged by the Examiner, Kordsmeyer teaches and relies upon a fixed length PDU. Indeed, the predefined radio interface contemplated by Kordsmeyer is based on fixed length PDUs. Placing a PDU with a length that varies (as described by Van Grinsven) into the system of Kordsmeyer would prevent the system of Kordsmeyer from working with the predefined radio interface protocol. This would render the system of Kordsmeyer unfit for its intended purpose. It would not improve the invention of Kordsmeyer in functioning within a predefined protocol, rather it would fundamentally alter the invention and require a new protocol. Therefore, Kordsmeyer cannot properly be combined with Van Grinsven.

In addition, embodiments of the present invention are directed to fourth generation (4G) wireless applications and to related problems such as providing bandwidth on demand. A person of ordinary skill in the art looking to solve such problems would not be motivated to look to the

DECT protocol or to modifications of the DECT protocol. Indeed, the DECT protocol is primarily used for cordless phones and baby monitors and would not be looked to for solutions to 4G problems. Further, as noted above, the DECT protocol and Kordsmeyer's teachings require fixed size PDUs. This requirement in DECT, and the emphasis placed on compatibility with DECT by Kordsmeyer, would discourage one of ordinary skill in the art to look to variable length PDUs. For at least these additional reasons, Kordsmeyer cannot properly be combined with Van Grinsven.

In view of the arguments above, Appellant respectfully submits that claims 51-55, 63-67, 75, 82-90 and 98 are allowable over the cited references.

B. Claims 56 and 68 are patentable over Kordsmeyer in view of Van Grinsven and Sengodan.

In the Office Action, claims 56 and 68 were rejected as being unpatentable over Kordsmeyer in view of Van Grinsven and Sengodan et al. (U.S. Patent No. 6918034) under 35 U.S.C. §103(a). Claims 56 and 68 depend from claims 51 and 63 respectively. AppellantAppellant respectfully submits that the arguments above with respect to claim 51 and 63 apply equally to claims 56 and 68 and that claims 56 and 68 are allowable for at least the same reasons. Sengodan has no teachings to overcome the shortcomings of Van Grinsven noted above.

C. Claims 57-62 and 69-74 are patentable over Kordsmeyer in view of Van Grinsven and Caronni.

In the Office Action, claims 57-62 and 68-74 were rejected as being unpatentable over Kordsmeyer in view of Van Grinsven and Caronni et al. (U.S. Patent No. 6970941) under 35 U.S.C. §103(a). Claims 57-62 and 68-74 depend from independent claims 51 and 63

respectively. Appellant respectfully submits that the arguments above with respect to claims 51 and 63 apply equally to claims 57-62 and 68-74 and that claims 57-62 and 68-74 are allowable for at least the same reasons. Caronni has no teachings to overcome the shortcomings of Van Grinsven noted above.

D. Claims 91-94 are patentable over Kordsmeyer in view of Van Grinsven and Hathaway.

In the Office Action, claims 91-94 were rejected as being unpatentable over Kordsmeyer in view of Van Grinsven and Hathaway et al. (U.S. Patent Pub. No. 20020126677) under 35 U.S.C. §103(a). Claims 91-94 depend from independent claim 51. Appellant respectfully submits that the arguments above with respect to claim 51 apply equally to claims 91-94 and that claims 91-94 are allowable for at least the same reasons. Hathaway has no teachings to overcome the shortcomings of Van Grinsven noted above.

E. Claims 95 and 96 are patentable over Kordsmeyer in view of Van Grinsven, Hathaway, and Payne.

In the Office Action, claims 95 and 96 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kordsmeyer in view of Van Grinsven and Payne (U.S. Patent Pub. No. 20060062250). Appellant respectfully submits that the Payne reference is not prior art against the present application. In order to qualify as prior art under §103(a), Payne must qualify as prior art under one of the relevant sections of §102. Payne has a filing date of August 29, 2005 and a publication date of March 23, 2006. The present application was filed on January 15, 2002. Thus, Payne does not qualify as prior art under sections 102(a) or (b). Due to the deficient priority claim, Payne also fails to qualify as prior art under section 102(e). In particular, while Payne purports to be a divisional of application serial no. 09/105,826, Appellant notes that the

'826 application went abandoned on January 09, 2004. As noted above, Payne was not filed until August 29, 2005, more that 18 months after the '826 application went abandoned. Thus, Payne cannot properly claim the benefit of the '826 application and cannot be used as prior art under section 102(e). Without Payne as a valid reference, Appellant respectfully submits that the Office Action fails to present a *prima facie* case of obviousness against claims 95 and 96.

In addition, claims 95 and 96 depend ultimately from claim 51. Appellant respectfully submits that the arguments above with respect to claim 51 apply equally to claims 95 and 96 and that claims 95 and 96 are allowable for at least the same reasons. Payne and Hathaway have no teachings to overcome the shortcomings of Van Grinsven noted above.

CONCLUSION

In view of the foregoing, Appellant respectfully submits that the claimed invention is patentable over the references of record. The Examiner has failed to identify or provide teachings in the references for each of the claim limitations. Appellant respectfully requests reversal of the Examiner's rejections.

Respectfully submitted,

Dated: 1-21-11

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VIII. CLAIMS APPENDIX

1 – 50 (CANCELLED)

51. A node for use in a communications system that packs and fragments variable-length service data units (SDU) for mapping into variable length protocol data units (PDU), each PDU having a payload area, and a header area, each SDU being associated with a specified connection, the node comprising:

a communications processor configured to pack and fragment service data units associated with the specified connection into a protocol data unit, including performing the following operations:

establishing a length for the protocol data unit based on bandwidth allocated to the specified connection in a current frame,

mapping a first service data unit to the payload area of the protocol data unit,

determining whether a second service data unit is larger than the remaining payload area of the protocol data unit,

if the second service data unit is not larger than the remaining payload area of the protocol data unit, then mapping the second service data unit to the remaining payload area of the protocol data unit, and

if the second service data unit is larger than the remaining payload area of the protocol data unit, then fragmenting the second service data unit into at least two fragments and mapping the first fragment to the payload area of the protocol data unit, wherein:

the header area of the protocol data unit includes a length field specifying the length of the protocol data unit, and

the payload area of the protocol data unit includes a packing subheader for each service data unit and each service data unit fragment packed in the payload area, the packing subheader specifying the length of a respective service data unit or a respective fragment.

52. The node of claim 51, further comprising:

a transmitter coupled to the communications processor configured to map the protocol data unit into frames and transmit the frames from the node.

53. The node of claim 51, wherein service data units of different protocols and packet formats are mapped to protocol data units of a common format.

54. The node of claim 51, wherein the packing subheader further comprises a fragmentation control field specifying whether the protocol data unit includes a service data unit fragment.

55. The node of claim 54, wherein the fragmentation control field comprises at least two bits.

56. The node of claim 51, wherein the packing subheader further comprises a fragment sequence number.

57. The node of claim 51, wherein the header area of the protocol data unit comprises a packing subheader present field.

58. The node of claim 57, wherein the packing subheader present field comprises at least one bit.

59. The node of claim 51, wherein the header area of the protocol data unit comprises an encryption control field.

60. The node of claim 59, wherein the encryption control field comprises at least one bit.

61. The node of claim 51, wherein the header area of the protocol data unit further comprises an encryption key field.

62. The node of claim 61, wherein the encryption key field comprises at least two bits.

63. A base station for use in a communications system, that packs and fragments variable-length service data units (SDU) for mapping into variable length protocol data units (PDU), each PDU having a payload area, a header area, and being associated with a specified connection, the base station comprising:

a communications processor configured to pack and fragment service data units associated with the specified connection into a protocol data unit including performing the following operations:

establishing a length for the protocol data unit based on bandwidth allocated to the specified connection in a current frame, wherein the bandwidth allocated to the specified connection is established based on one or more communication parameters,

mapping a first service data unit to the payload area of the protocol data unit,

determining whether a second service data unit is larger than the remaining payload area of the protocol data unit,

if the second service data unit is not larger than the remaining payload area of the protocol data unit, then mapping the second service data unit to the remaining payload area of the protocol data unit, and

if the second service data unit is larger than the remaining payload area of the protocol data unit, then fragmenting the second service data unit into at least two fragments and mapping the first fragment to the payload area of the protocol data unit, wherein:

the header area of the protocol data unit includes a length field specifying the length of the PDU, and

the payload area of the protocol data unit includes a packing subheader for each service data unit packed in the payload area, the packing subheader specifying the length of a respective service data unit.

64. he base station of claim 63, further comprising:

a transmitter coupled to the communications processor configured to map the protocol data units for the specified connection into frames together with protocol data units from other

connections that share a communication link with the specified connection and transmit the frames from the base station.

65. The base station of claim 63, wherein service data units of different protocols and packet formats are mapped to protocol data units of a common format.

66. The base station of claim 63, wherein the packing subheader further comprises a fragmentation control field specifying whether the protocol data unit includes a service data unit fragment.

67. The base station of claim 66, wherein the fragmentation control field comprises at least two bits.

68. The base station of claim 63, wherein the packing subheader further comprises a fragment sequence number.

69. The base station of claim 63, wherein the header area of the protocol data unit comprises a packing subheader present field.

70. The base station of claim 69, wherein the packing subheader present field comprises at least one bit.

71. The base station of claim 63, wherein the header area of the protocol data unit further comprises an encryption control field.

72. The base station of claim 71, wherein the encryption control field comprises at least two bits.

73. The base station of claim 63, wherein the header area of the protocol data unit further comprises an encryption key field.

74. The base station of claim 73, wherein the encryption key field comprises at least two bits.

75. The base station of claim 63, wherein the header area of the protocol data unit comprises a connection identifier field.

76-81. (Canceled).

82. A node as claimed in claim 51, wherein the first SDU is a last fragment of a SDU.

83. A method of formatting protocol data units (PDUs) from incoming variable-sized service data units (SDUs) for transmission of data carried by the PDUs over a communication channel shared by one or more user connections, comprising, for a specified connection:

provisioning a protocol data unit (PDU), including a header and a payload area, wherein the length of the PDU is established in conjunction with the bandwidth amount allocated to the specified connection in a current frame, the bandwidth amount being established frame-by-frame based on one or more communication parameters associated with the specified connection and general system parameters; and

packing and fragmenting the SDUs associated with the specified connection into the payload area of the PDU based on the current length of the payload area.

84. The method of claim 83, wherein the length of the PDU changes as the bandwidth allocated to the specified connection changes.

85. The method of claim 83, wherein the step of packing and fragmenting comprises:

mapping one or more SDUs into the payload area of the PDU until a remaining area in the payload area of the PDU cannot accommodate a next SDU;

fragmenting the next SDU into a first and a second fragment, the first fragment having the length of the remaining area;

mapping the first fragment to the remaining area; and

inserting fragmentation header information to indicate the fragmentation state of the payload and to identify the first fragment as being a first fragment.

86. The method of claim 85, wherein any SDU fragment includes a fragmentation control field identifying the SDU fragment.

87. The method of claim 85, wherein the step of packing and fragmenting further comprises:

mapping the second fragment to a next PDU if the length of the second fragment fits into the length of the payload area of the next PDU; and

inserting fragmentation control information to indicate the fragmentation state of the payload and to identify the last fragment as being a last fragment.

88. The method of claim 85, wherein the step of packing and fragmenting comprises:

further fragmenting the second fragment if the length of the second fragment is larger than the length of the payload area of a next PDU to obtain a third fragment having the length of the payload area of the next PDU;

mapping the third fragment to the next PDU; and

inserting fragmentation control information, to indicate the fragmentation state of the payload and to identify the third fragment.

89. A method for use in a communications system that maps variable length service data units (SDU) associated with a specified connection according to a plurality of service level for the data carried by the SDUs, into a protocol data unit (PDU) having a variable-length payload area and a header area, the method comprising:

establishing a length for the protocol data unit based on bandwidth currently allocated to the connection in a current frame, wherein the bandwidth allocated to the connection is established based on one or more communication parameters;

receiving a first service data unit and a second service data unit;

fragmenting the second service data unit into at least two fragments;

packing the first service data unit and a corresponding packing subheader into the payload area of the protocol data unit; and

packing a first fragment of the second service data unit and a corresponding packing subheader into a remaining portion of the payload area of the protocol data unit,

wherein each packing subheader comprises a length field specifying the length of the corresponding service data unit and a fragmentation control field indicating whether the

corresponding service data unit is a first fragment, a continuing fragment, a last fragment, or an unfragmented service data unit.

90. The method of claim 89, wherein the length of the packing subheaders is variable.

91. The node of claim 51, further comprising a classification module for classifying the SDUs based on at least a connection identifier, for enabling packing and fragmenting of the SDUs on the connection in a PDU allocated to that connection.

92. The node of claim 91, wherein the classification module uses control protocols specific to each particular type of SDU being classified.

93. The node of claim 92, further comprising a convergence sublayer module that processes the SDUs classified by the classification module for service specific connection establishment, maintenance, and data transfer operations.

94. The node of claim 93, further comprising a data queuing module wherein the SDUs are sorted based on the connection identifier and individual characteristics.

95. The node of claim 91, further comprising a communication control module which prepares a bandwidth allocation map with the bandwidth allocated to each node sharing the communication channel.

96. The node of claim 95, wherein the communications processor establishes the bandwidth allocated to each connection from the bandwidth currently allocated to a respective node based on the priority and type of the connections served by the node.

97. The node of claim 51, wherein if the first service data unit is larger than the payload area of the protocol data unit, fragmenting the first service unit to obtain a fragment of the size of the payload area of the protocol data unit and mapping the fragment to the protocol data unit.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.